

ARCS PROCEDURE:	COMPRESSED GAS CYLINDER HANDLING	PRO(OPS)-031.000
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Compressed Gas Cylinder Handling

I. Purpose:

The purpose of this procedure is to give general guidance to the Observers on proper and safe handling of compressed gas cylinders. Compressed gas cylinders that could be encountered on an ARCS site are Helium and Nitrogen. Hydrogen, a flammable gas, is encountered in the Electrolyser Hydrogen Generator system, but it is not intended to be covered by this procedure.

II. Cautions and Hazards:

- Hazards generally associated with compressed gas cylinders are flammability, corrosion, reactivity, toxicity, oxygen depletion, and mechanical injury if not handled, operated and stored properly. Because only Helium and Nitrogen are expected to be encountered on the ARCS site the only hazards from the above list applicable to the ARCS is oxygen depletion and mechanical injury.

III. Requirements:

None

IV. Procedure:

A. General Handling:

- Strap or fix cylinders in place (when in use or in storage) to prevent the cylinders from falling or damaging the valves, regulator, and piping with chains, cylinder racks, or other approved devices.
- Keep cylinder valve caps in place at all times, except when the cylinder is installed and connected to a pressure system.
- Never force a valve open and always open cylinder valves slowly.
- Maintain cylinders in good condition and maintain all cylinder labels.
- Cylinders shall be legibly marked with labels that identify the operating pressure, temperature, material of construction and contents.
- No maintenance or repair work on a cylinder shall be performed with it under pressure.
- Any cylinder with supplied a protective cap shall have its cap removed and the mating threads be given a liberal coating of general purpose grease. This shall be carried out every three months or until the cylinder is used. (Cylinders provided with caps, left outside tend to seize up and the caps are difficult to remove.)
- Cylinders with damaged valves SHALL NOT be used and shall be returned to the supplier as is, noting the defect.

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Moving cylinders:

- Before moving cylinders from its secured "in-use" position, remove regulator and secure protective cap.
- Move cylinders on cylinder carts or with other approved cylinder transporting devices.
- Never roll or drop cylinders. If a cylinder falls while being rolled, severe foot injury or damage to the cylinder itself could result.
- Never lift cylinders by their protective caps or valves.
- Wear safety shoes or toe protection when moving cylinders.

B. Storage of Cylinders:

- Store cylinders containing flammable, corrosive, toxic, or otherwise hazardous gases outside buildings and away from doors, windows, and building air intakes. Inert gases may be stored inside if there is sufficient space and ventilation to preclude asphyxiation hazards.
- Protect stored cylinders against heat, corrosive atmospheres, rain, snow accumulation, and full sunlight. The storage area should be paved and easily accessible to delivery trucks and users with cylinder carts. Cylinder storage areas should drain readily, which may require that cylinders be placed on pallets or otherwise raised above surrounding surfaces.

C. Valves, Regulators:

- Before attaching a regulator to the cylinder, carry out the following:
Remove the plastic outlet plug and open the cylinder valve SLOWLY and allow a SHARP SHORT jet of gas to escape to atmosphere. Ensure safety goggles are worn during this operation. (This is carried out to remove any foreign particle that may be present in the neck prior to attaching the regulator.)
- All cylinders shall have a shutoff valve designed according to Compressed Gas Association standards. This valve cannot be used to control the discharge rate, therefore a regulator must be connected to the cylinder while it is in use.
- Use only the approved regulator for the gas in use.
- Never attempt to repair a regulator. Expert repair and calibration of regulators is necessary for continued reliability and safety. Never use an adapter.
- Each part of a compressed gas system that can be pressurized separately must be protected by a pressure relief device set to operate at pressure equal to or less than the Maximum Allowable Working Pressure(MAWP).

D. Inspection:

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- Visual inspection all cylinders annually and report their condition.
- Return all empty cylinders to the manufacture as soon as possible.
- Relief devices shall be checked and calibrated for the required setting and operation at least every 3 years for corrosive service.
- Do not use any cylinder, with or without gas, that has remained on site over 5 years. Return it immediately to the Manufacturer. Cycle in cylinder use so that the oldest cylinders are used first.

V. References:

1. PRO(BBSS)-002.004 BBSS Launch Operations Procedure
2. PRO(GEN)-004.002 Weekly Maintenance Procedure for GENSET
3. LANL LIR 402-1200-01-0, Pressure, Vacuum, and Cryogenic Systems.
4. LANL Technical Bulletin 1402, Compressed Gasses

VI. Attachments:

None